

## SPHAGNUM SUBSECUNDUM IN WESTERN AUSTRALIA

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The first published record of the occurrence of the genus *Sphagnum* in Western Australia appears to be that of Nicholls (1933) in a footnote: "A couple of patches of *Sphagnum* were recently found on the banks of a drying creek in karri forest country 40 miles S.E. of Manjimup". Unfortunately Professor G. E. Nicholls' specimens have been lost, but there is a collection of a *Sphagnum* in the Herbarium of the Botany Department of the University of Western Australia made by Dr. J. I. Armstrong and Professor A. J. Eames and simply labelled "Eames and Armstrong, Manjimup 1938". It is very likely this collection was made at or near the site of Nicholls' discovery as Nicholls and Armstrong were, about that time, respectively Heads of the Departments of Zoology and Botany in the University of Western Australia.

In 1952 J. H. Willis of the National Herbarium of Victoria examined the Eames and Armstrong specimen (Specimen UWA 64) and determined it as *Sphagnum subsecundum* Nees (Willis, 1954).

In August 1966, the author searched in the vicinity of the Weld River Bridge where it is thought Nicholls made his collection and found a small stand of *Sphagnum* in a wetland depression named Ant Pool by the State Forestry Department. The collection proved to be, on vegetative characters, *Sphagnum subsecundum* Nees (Specimen UWA 477) and it agreed with the Eames and Armstrong specimen determined by J. H. Willis.

### ECOLOGY

Ant Pool is located on the west bank of the Weld River 10 miles south of Shannon Mill townsite on the west side of the South-Western Highway. The Ant Pool basin is a part of an extensive wetland depression bounded on the east by the South-Western Highway, on the north by Ant Road south and on the west by Mossop Road south, the latter two roads being State Forestry Department forest access roads.

This wetland is in forest vegetation composed largely of *Eucalyptus marginata* Sm. (Jarrah), and *E. calophylla* R.Br. (Marri) with adjacent areas of *E. diversicolor* F. Muell. (Karri). The Ant Pool area is best described in the vernacular as a "paper-bark swamp" since much of its surface is covered by the paper-bark trees, *Melaleuca raphiophylla* Schau., and *M. parviflora* Lindl. A dense scrub community of myrtaceous shrubs fringes the margin of the swamp and extends over the wetland in a mosaic with a sedge-dominated community. This scrub is composed largely of thickets of *Agonis linearifolia* (DC.) Schau., *A. juniperina* Schau., *A. parviceps* Schau., *Leptospermum firmum* (Schau.) Benth., *Melaleuca blaeriaefolia* Turcz., *Kunzea recurva* Schau., together with much *Gahnia decomposita* Benth., *Acacia hastulata* Sm., and *Gompholobium tomentosum* Labill. Small stands of *Cephalotus follicularis* Labill., occur in the fringing scrub community. The central area of this part of the wetland consists of a meadow of *Leptocarpus scariosus* R.Br., and small stands of *Boronia megastigma* Nees. It is of slightly higher elevation than the peripheral part of the wetland where creeks meander under the scrub and tree communities. The stand of *Sphagnum subsecundum* occurs in one of these creeks.

The mats of *Sphagnum* are not extensive, only two mats, each less than a metre square, were found in this creek. The peat moss grows in black mud of the creek bed, hardly covered by slowly moving water at the time of collection and densely shaded by trees and shrubs. The mud is composed largely of finely divided humus derived from myrtaceous plants and sedges and having much ash from a severe bushfire of the summer of 1965-66. The mud about the *Sphagnum* plants was 12 centimetres deep underlain by grey sand. The banks of this creek are of a lignin peat braced thickly with roots of the scrub community. Two samples of the mud taken from the *Sphagnum* mats gave pH values of 5.10 and 5.35 respectively. The *Sphagnum* shoots were embedded in the mud with compact green leafy heads at ground level. None of the shoots was fertile.

At the time of the author's first collection in August 1966, the swamp was readily accessible since a fire of the previous summer had burnt most of the undergrowth and tree foliage on the site of the *Sphagnum* and foliar regeneration was not very advanced. On a second visit to the site in May 1967, re-growth of the scrub made access to the creek system difficult. In some unburnt areas the undergrowth was almost impenetrable. The heavy shade canopy that normally prevails on this *Sphagnum* site no doubt enables the peat moss to persist in a creek system which contains little water in summer.

Churchill (1961) in describing his Weld River Swamp, which is within a few miles of Ant Pool and essentially a part of the same wetland system, claims that the swamp is situated on a sandy basement which slopes steeply to the Weld River. Churchill found the greatest depth of peat to be two metres and underlain by a metre of peaty sand. He recorded pH values of the order of 3.3 to 4.0 in the top half metre of the peat and concludes that the high relief of the area and its highly acid conditions are indicative of Oligotrophic, High-moor conditions. From his palynological studies Churchill has interpreted the history of this swamp system as commencing as a sandy seepage area bearing a long-standing restionaceous sedge flora which gradually built up low peaty mounds. These mounds were subsequently colonised by other swamp plants and the relative proportion of restionaceous sedges decreased.

There are only three other records of *Sphagnum* in Western Australia. The former Government Botanist, Mr C. A. Gardner, claims to have collected a peat moss from a bog on the Mordalup road, east of Manjimup prior to Nicholls' collection (pers. comm.). The specimen of this collection has been lost.

In February 1968, Mr Alan Burn, a surveyor in search of peat in commercial quantity, collected *Sphagnum* from a bog on the road to Mordalup, 13 miles east of Manjimup and again at Beedalup Falls close to Pemberton where a small mat of the moss was found on leaf mould in the Karri forest on the bank of the Beedalup River. I have not seen these specimens but no doubt they would be referable to *S. subsecundum*.

These localities which are relatively close to one another, suggest that *Sphagnum* might well occur in similar sites in the karri forest or in wetland depressions in the south-west of this State. However, there has been little botanical investigation of such habitats. Churchill (1961) in his palynological studies of peat swamps of the South West did not find living *Sphagnum* or fossil evidence of it although he searched for this genus. Smith (1962) in his study of moss swards of the granite rocks of the Porongorup Range did not find *Sphagnum* although likely habitats were searched. Mr. Alan Burn has quite recently searched a large number of wetlands in the South-West and has been



successful in making only the two collections of *Sphagnum* mentioned above. Whilst further searching would perhaps yield further records, *Sphagnum* is undoubtedly rare in Western Australia.

## DISCUSSION

Crocker and Eardley (1939) described a *Sphagnum* peat bog near Millicent, South Australia, commenting upon the rareness of *Sphagnum* in that State. They did not identify the species of the peat moss but the author of this paper has recently examined their specimens and identified them as *Sphagnum subsecundum* Nees (Specimen ADW 3696, leg. R. L. Crocker, April 1939, loc., Bog near Lake Leake, Boundary of Hundred of Hindmarsh and Riddoch, det., *Sphagnum* sp. by C. M. Eardley; Specimen ADW 4638, leg., R. L. Crocker, April 1939, loc. Bog 10-15 miles east of Millicent det., *Sphagnum subsecundum* Nees by D. G. Catcheside).

Subsequent collections of *Sphagnum* from the Millicent district, if not from the bog described by Crocker and Eardley, have been examined by the author and determined as *Sphagnum subsecundum* Nees. These include Specimens ADW 18154, leg., C. M. Eardley, Feb., 1942, loc., Mt. Burr Forest; Specimen AD 96814004 leg., R. B. Moore, Feb., 1953, loc., west of Lake Leake; Specimen AD 96814005, leg., probably R. Tate, loc., between Mt. Burr and Mt. McIntyre; Specimen AD 96814003, leg., I. B. Wilson, Oct. 1966, loc., 2 km., north of Wandilo. From these records it would appear that the Millicent district provides habitats favourable to the peat moss in an otherwise arid region for a western extension of this species from its main area of distribution in eastern Australia, Tasmania and New Zealand.

It is to Willis (1952, 1953) that we owe the clarification of the long-standing confusion and uncertain situation of the nomenclature and distribution of the Australian sphagna. Willis has shown that five species of *Sphagnum* occur in Australia including Tasmania. Their occurrence may be tabulated as follows:

	VIC.	N.S.W.	TAS.	QLD.	S.A.	W.A.
<i>Sphagnum australe</i> Mitt.	+	+	+	-	-	-
S. <i>beccarii</i> Hampe	+	+	-	+	-	-
S. <i>cristatum</i> Hampe	+	+	+	+	-	-
S. <i>falciculatum</i> Besch.	+	+	+	+	-	-
S. <i>subsecundum</i> Nees	+	+	+	+	+	+

The distribution of sphagna in Australia may have some phytogeographic significance, as implied by Nicholls (1933) with regard to the present distribution of certain lower plants, including *Sphagnum*, in southern Australia. However, no conclusion may be reached on this subject with regard to *Sphagnum* for want of sufficient ecological and palynological evidence. At present it is only apparent that in the more arid and less mountainous States such as Western Australia and South Australia the genus *Sphagnum* has few suitable habitats available to it and is consequently rare.

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## THE GHOST CRABS (OCYPODE) OF DIRK HARTOG ISLAND

By B. M. ALLENDER.

### INTRODUCTION

In September 1967, Wesley College conducted an expedition with 28 boys to Dirk Hartog Island. Of this number, a group of five students was involved in marine biology projects. One of these projects was a study of the behaviour and other selected characteristics of the ghost crabs of the island. The observation team comprised J. Gliddon, C. Hoskin, D. Masters, M. Saunders, G. Shaw, and the author.

### PROCEDURE AND ECOLOGICAL OBSERVATIONS

Two localities were examined for crabs—three northern beaches around Cape Inscription, and the beach south of Sandy Point (Fig. 1). The northern beaches were small and shallow,